CONTRIBUTIONS OF THE
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During the past three years the DOE has undergone a remarkable transformation from the stunned widower of the 20th Century Cold War into the embryonic prototype of the 21st Century federal agency. Change has occurred in ways and on a scale that transcends the normal perception frame of most observers. But today the signs of effective, evolutionary adaption are widespread and robust. In terms of significant events, changes number in the thousands. They are manifest at every level of the Department's operations, from the Secretary's Office down to the small groups of hands-on workers, technicians and scientists that today form the backbone of the work force. The era of the nuclear engineer is largely passed.

Throughout this period, one DOE-wide forum has served as the steadying mid-wife to the labor of rebirth. That forum is the Department Standards Committee (DSC). Mid-wife and not leader, for the transformation is one that has arisen directly from the diverse work of many individual initiatives. While there are major themes that characterize the emerging DOE, no one office or group can lay claim to the "most influential" prize. Today the community of DOE knowledge workers is one of the foremost "complex adaptive systems" (CAS) in the world. It has no choice but to become so, for the missions assigned to the agency present some of the most formidable sources of uncertainty faced by any organization of comparable size. Missions of fundamental and leading importance to the entire nation in the coming century.

> Peter Drucker recently stated "The only comparative advantage of the developed countries is in the supply of knowledge workers. This means continual, systematic work on the productivity of knowledge and knowledge workers. Knowledge is different from all other kinds of resources. It constantly makes itself obsolete, with the result that today's advanced knowledge is tomorrow's ignorance."

Many have questioned the need for DOE's existence now that its most conspicuous mission, nuclear armorer, is largely finished. This issue has been in doubt for a decade. Today there is emerging a new perspective. One that provides cohesion to the Department's portfolio. The new business of the DOE is to manage the "Peculiar." It operates at the edge of chaos in the realm of our society's knowledge about complex technological and biological systems. Its diverse science, cleanup, energy and world-wide security challenges have one characteristic in common. Each contains a large component of *unconventional uncertainty*. More than most, this portfolio demands the "continual, systematic work on the productivity of knowledge and knowledge workers." The Department Standards Committee has nurtured the beginnings of this systematic work.

CAS are natural systems. They cohere into existence when the environment presents new challenges that old methods cannot manage. In human systems, re-inventive transformation occurs. In the societal ecology the arrival of a new "species" is difficult to detect because the corporate labels and the individual agents often remain the same. The

very persistence of an organization in the face of unprecedented change is the leading indicator of a CAS at work. As yet, few are accustomed to the perspective that permits viewing the new DOE as a coherent whole. To capture in one skin, the complex, diverse and hazardous work that is the daily menu of DOE, a new language of work and work design has had to emerge. The Standards Committee, more than any other group, has been the champion for development of that language.

The Committee's work has been focused on effective adaption from the outset. It began in the aftermath of an oversimplified approach to the task of making the Department a place in which "standards based operation" was a hallmark. This goal was an appropriate response to public concerns about the safety of how the DOE operated during the many preceding decades of secrecy. While the goal made sense, the methods chosen to restore public faith were ill-conceived given the enormous diversity of the Department's mission activities. Forward looking managers now see this fact, but the organization had to learn this lesson from experience. The DSC has become a key processor for the Department as a self-aware, learning organization.

The failed method was an attempt to invoke pre-existing DOE management directives as detailed, prescriptive contract standards. Historically DOE had used a verbal management culture overlaid on a engineering production scheme. The move to "engineer" management seemed a logical one at the time. However, after three years of such effort, many around the DOE complex had become dissatisfied. The efforts to impose a highly traditional, "top-down" hierarchical system for setting performance expectations were routinely defeating well- intentioned workers and giving standards a bad name. Obsessive attention to line by line Order compliance, that rewarded risk-free paper demonstrations over doing work safely, had become a routine state of affairs in many quarters. As noted in the 1994 Galvin report, the resulting danger to the viability of the nation's premier scientific establishment was real and palpable.

The DSC was born out of the urgent need for a more diverse and inclusive view of safety and standards and of the way in which DOE defines its mission work. Inclusive, collaborative effort became a defining characteristic of the Committee's work. This non-bureaucratic perspective has created a virtually unique forum within a Department that still runs largely on the basis of traditional notions of management borrowed from the corporate giants of mid-century.

The Committee serves as a market-place of ideas not as a commanding oracle. Ideas about how the Department can successfully function in a world of complex, often conflicted expectations. Ideas for which the voice of those most knowledgeable of the work and associated hazards (i.e. the workers, technicians, and scientists) is also most respected. The DSC leadership, prominently Dr. Tara O'Toole (EH), Dr. Dave Nelson (ER) and Dr. Jim Turner (Oakland Operations), recognized that DOE knowledge workers must be served by contractor and federal managers, not endlessly sanctioned, in order for the Department to safely and effectively meet the demands of the 21st century.

The Committee's initial effort produced the *Criteria for the Department's Standards Program.* This document anticipated of many of the key terms and concepts in a new management language. Now commonplace notions of tailored, agreed-upon (i.e. performance-based) standards, integration of safety and mission planning and decision making "at the level appropriate to effective management" were all first stated in the *Criteria*. It was the distillation of more than one hundred outspoken voices on what DOE must necessarily mean to demonstrate standards-based operations in the future. Crafted largely from the perspective work managers in the middle of the Department's hierarchy it speaks presciently to how a productive *system of delivery for standards based work* must be shaped in the era of "knowledge work."

But the *Criteria* is a high level standard, more representative of the end in mind than a tool for the journey of transformation. Subsequently the Committee sharpened its focus on tool-making activities. The next development was the *Work Smart Standards* (WSS) process for the design of work and the identification of applicable standards for doing that work safely. Described in DOE Policy 450.3, the Work Smart process is a protocol for arriving at robust agreement, between DOE and its contractors, on the performance expectations for work that includes uncommon levels of uncertainty about both the "as is" conditions and the future ones.

Developed around the identification of safety standards, it is now generally recognized that the methods of WSS address the essence of the problem of integration in a manner appropriate to most *complex adaptive systems of work delivery*. The DSC demonstrated in a series of pilots that these principles can function at many different levels of organization. It has developed, from research into the conditions of real work in the field, guidance on *effective implementation , documentation for standards based work,* and *tailoring of standards and work design*. Research continues in critical functions such as *assessment, management of initiatives*, and *communication of experience*. The emphasis here is on practical advice that can increase the productivity of knowledge and knowledge workers.

Together with other initiatives such as Enhanced Work Planning sponsored by the Office of Environment, Safety and Health, the critical value of worker knowledge and local work design have been conclusively demonstrated. The principles of Integrated Safety Management, subsequently endorsed in DOE Policy 450.4, are reflective of these pioneering efforts. Many DSC members have leadership roles in the crafting of the ISM policy and its implementation. The recent changes to the Department of Energy Acquisition Regulations that establish performance based contracting as policy would be unthinkable without the ability to develop tailored, standards based integrated safety management systems using these new tools and their insights about *cooperative engagement*. This fact is not yet fully recognized.

True to its beliefs, the Committee is the only forum in which initiatives are vetted among all the program offices and field organizations before they are launched. And it operates on discretionary funding of the participant organizations and so must practice what it

preaches if it is to survive. The researches into standards-based management principles have been funded out of the resources of the line organizations that participate and guide the Committee's work. The remarkable persistence of the DSC speaks to its historic value added. In an environment with an extraordinary flux of political, institutional and physical expectations something like the DSC appears to be needed if the organization is to develop sufficient self-awareness to be able to monitor its own effectiveness.

Characteristic of the DSC's core values , Work Smart and its related guidance documents are voluntary standards. Work Smart's effectiveness depends upon an *agreement to agree* that is the antithesis of bureaucratic prescription. *Cooperative engagement* among the parties to any agreement is the essence of these principles. An atmosphere of distrust and recrimination are seen as incompatible with work in DOE's fluid expectations environment. However, having this realization is not sufficient to overcome historic enmities that are a residue of earlier management systems. Some of the most vivid demonstrations of Work Smart (e.g. FermiLab, Oak Ridge, LANL and LBNL) have led to dramatic improvements in the local relationships between DOE and its contractors.

The DSC did not compel these changes, rather it encouraged their possibility and celebrated their emergence. It is these unprecedented functions that make the Department Standards Committee such a uniquely valuable institution. Consistent with its charter it is an adjunct to policy making not a competitor for it. This fact is not always recognized, and the Committee is not always viewed as a boon. From the perspective of a sophisticated Complex Adaptive System operating in a diverse and challenging ecology, this is not surprising. The DSC functions in an awkward and seemingly serendipitous manner that can create discomfort for those who value energetic and directed purposefulness.

So be it. For the task of "continual, systematic work on the productivity of knowledge and knowledge workers" remains primarily, one of learning. A Complex Adaptive System is first of all a careful observer of what works in its changing environment. In a system the size of DOE the DSC's *market-place of ideas* remains an effective and efficient way to collect and disseminate such observations.